

CLAIMS

1. A method of assigning sequence numbers to packets for transmission over a network comprising the steps of:

identifying a service level associated with a packet, wherein the service level is selected from a set of at least two service levels available for packets in the network;

responsive to the service level associated with the packet, assigning a sequence number to the packet, wherein the sequence number is related to a sequence number of a previously transmitted packet of the same service level; and

forwarding the packet over the network

2. A method for determining whether to discard a received packet at a node the method including the steps of:

comparing a sequence number associated with the received packet against sequence numbers associated with a selected number of previously received packets, wherein the received packet has a service level associated therewith, and wherein the selected number of previously received packets are of the same service level as the received packet; and

discarding the received packet in the event of a match between any one of the sequence numbers associated with the selected number of previously received packets and the sequence number associated with the received packet.

3. The method according to claim 2, further comprising the step of forwarding the received packet for processing in the event that there is no match between any one of the sequence numbers associated with the selected number of previously received packets and the sequence number of the received packet.

4. The method according to claim 2 further comprising the step of forwarding the received packet for processing in the event that the received packet is received a predetermined time after the selected number of previously received packets.

5. The method of claim 1, wherein the service level is determined in response to a differentiated services codepoint (DSCP) associated with the packet.

5 6. The method of claim 1, wherein there are at least two service levels and wherein the sequence number corresponding to a higher priority service level is separate from the sequence number corresponding to a lower priority service level.

7. The method according to claim 3, wherein at least one of the service levels corresponds to an Expedited Forwarding (EP) per hop behavior.

10 8. The method according to claim 3, wherein at least one of the service levels corresponds to an Assured Forwarding (AF) per hop behavior.

15 9. The method according to claim 3, wherein at least one of the service levels corresponds to a Best Efforts (BE) per hop behavior.

10. An apparatus for assigning sequence numbers at the sending node of IPSec tunnel , comprising:

a sequence number table, each entry associated with a service level and storing a number representing the last sequence number for that service level; and

20 means for assigning a sequence number to a packet to be transmitted based on the service level of the packet.

25 11. The method according to claim 10 wherein the means for assigning the sequence number operates to retrieve a last sequence number for that service level from the sequence number table and increment the last sequence number to provide a new sequence number to assign to the packet.

30 12. The method of claim 1, wherein the step of discarding the received packet in the event of a match is performed in accordance with an Internet Protocol Security (IPsec) anti-replay mechanism.

13. An apparatus for discarding redundant packets received at a receiving node, comprising:
a sequence number buffer, for storing sequence numbers associated with packets
received at the receiving node;
an anti-replay bitmask table, each entry associated with a service level and storing
the bitmask of sequence numbers of previously received packets to be compared in
determining whether to discard a received packet.

14. The apparatus of claim 8, wherein one of the entries of the anti-replay bitmask table is
associated with an Expedited Forwarding (EF) service level.

15. The apparatus of claim 8, wherein one of the entries of the anti-replay bitmask table is
associated with an Assured Forwarding (AF) service level.

16. The apparatus of claim 8, wherein one of the entries of the anti-replay bitmask table is
associated with a Best Effort (BE) service level.

17. The apparatus of claim 8, wherein the apparatus operates according to an Internet
Protocol Security (IPsec) protocol.

18. An apparatus comprising:

means for receiving a plurality packets having an associated plurality of sequence
numbers, wherein each one of the packets in the plurality of packets has a a service
level associated therewith, and wherein there are at least two types of service levels;

means for comparing, for each received packet, a received sequence number of each
received packet against a set of previously received sequence numbers, wherein the set of
sequence numbers includes only sequence numbers of packets, previously received within

a window and having a service level type corresponding to a service level type of the received packet.; and

means for discarding the received packet in the event of a match between the received sequence number and any of the sequence numbers in the set of sequence numbers.